CORR 2000-59

Ternary Ideal 2-level Autocorrelation Sequences

Michael Ludkovski* & Guang Gong*

Abstract Ternary sequences with ideal 2-level autocorrelation are investigated. First, we prove that any p-ary sequence with 2-level autocorrelation is balanced for any prime p. We then present newly discovered 3-term sequences and conjecture the existence of two new infinite families of ternary ideal 2-level autocorrelation (AC) sequences of period $3^n - 1$. We also use the technique of applying Second Order Decimation-Hadamard Transform (DHT) operator, which was recently developed by Gong and Golomb [10] to these 3-term ternary sequences with ideal 2-level autocorrelation. Some variations of the Second Order DHT are also discussed. Furthermore, an exhaustive search for 3-term ternary AC sequences has been performed for $2 \leq n \leq 9$ and inequivalence classes of these sequences are determined. Last, a construction of infinite classes of ternary AC sequences is given by applying the Gordon-Mills-Welch method to the newly discovered ternary sequences.

Index words 2-level autocorrelation, ternary sequences, Decimation-Hadamard Transform operator.